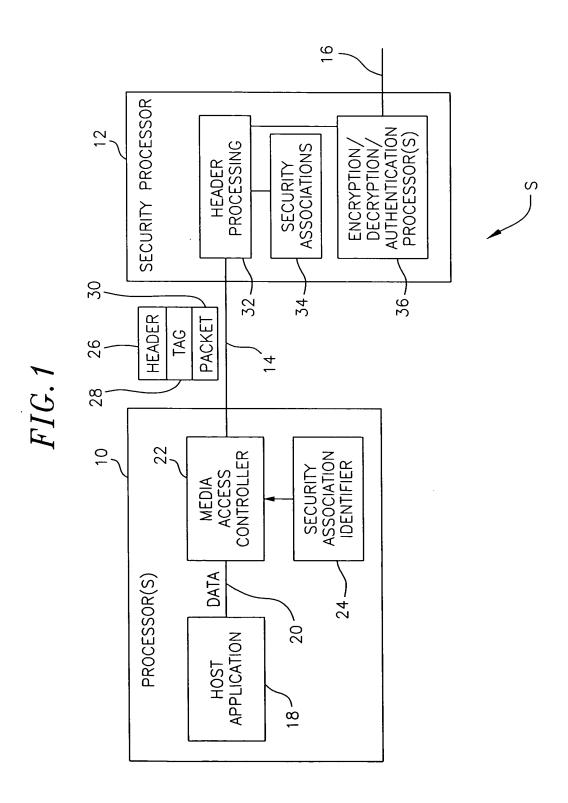Attorney: Stephen D. Burbach
Docket No.: 48946/SDB/B600
Inventor(s): Mark L. Buer, et al.
Title: TAGGING MECHANISM FOR DATA PATH
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FIG. 1

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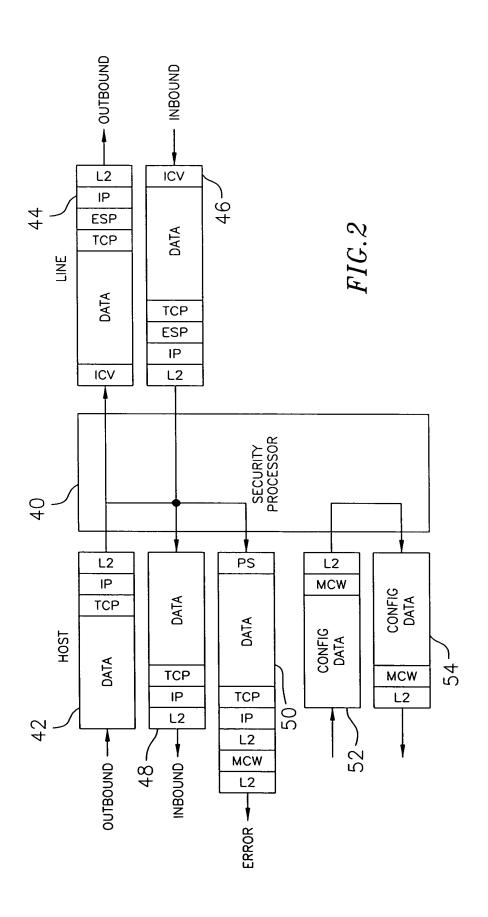SECURITY PROCESSING
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FIG.2

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CLASS-0

DA	SA	TYPE				DA	SA	TYPE	IP	DATA
S.P.	HOST	MFG	0	FLOWID						

60

62

64

OUTER
HEADER — 66

MFG HDR
(4 BYTES) — 68

ORIGINAL PACKET — 70

CLASS-58

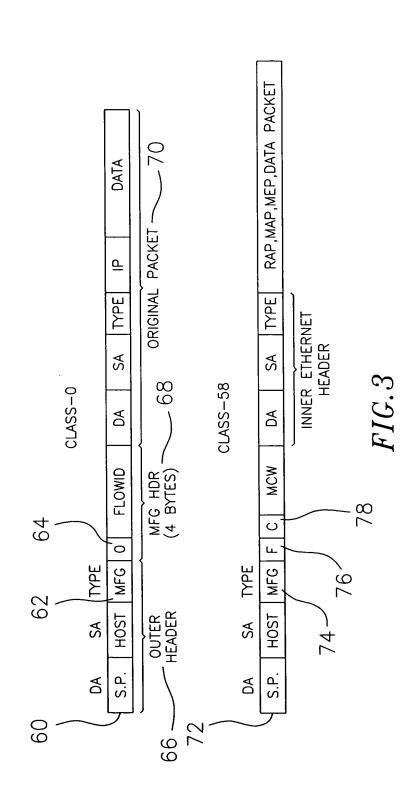| DA	SA	TYPE				DA	SA	TYPE	RAP,MAP,MEP,DATA PACKET
S.P.	HOST	MFG	F	C	MCW				

72

74

76

78

INNER ETHERNET
HEADER

FIG.3

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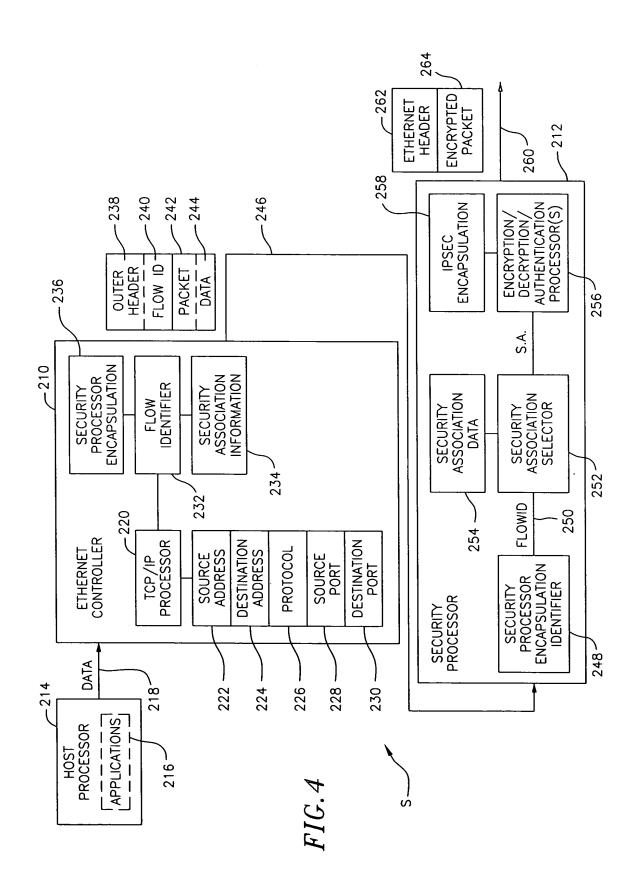
FIG. 4

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FIG.5

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FIG.6

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FIG. 7

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FIG.8

RESET —600

LOW POWER MODE —602

INITIALIZATION —604

PACKET FLOW ENABLED —606

—618

RECEIVE CONFIGURATION INFORMATION —608

RECEIVE SECURITY ASSOCIATIONS —610

—630

PROCESS PACKET TRAFFIC —612

RESET —614

CONFIGURE SECURITY PROCESSING —616

ESTABLISH COMMUNICATION PATH —620

ESTABLISH SESSIONS —622

SECURE? —624

NO

YES

GENERATE SECURITY ASSOCIATIONS —626

SEND SECURITY ASSOCIATIONS —628
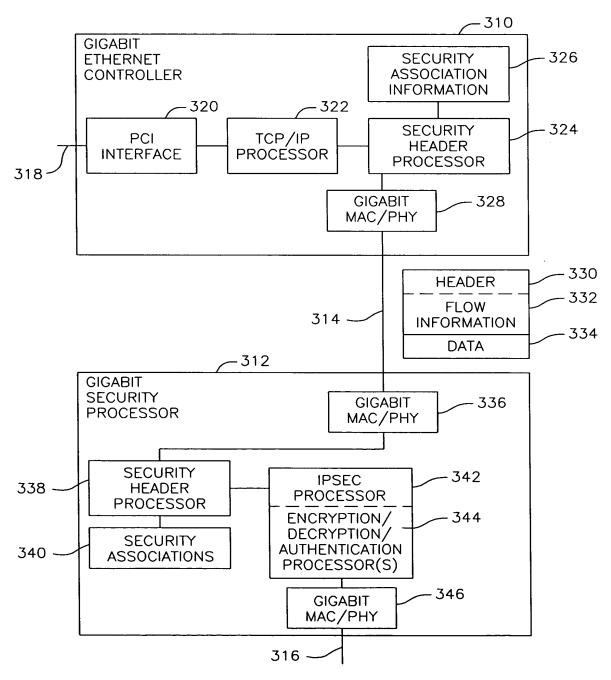
PROCESS PACKET TRAFFIC —632

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FIG.9

BEGIN —— 700

RECEIVE DATA FROM HOST —— 702

TCP/IP PROCESSING —— 704

SECURE? —— 706

NO

YES

IDENTIFY FLOW ID FOR SESSION —— 708

GENERATE HEADER —— 710

ENCAPSULATE PACKET —— 712

TRANSMIT PACKET —— 714

RECEIVE PACKET —— 716

SECURITY PROCESSOR ? —— 718

NO

YES

STRIP HEADER —— 720

RETRIEVE FLOW ID —— 722

RETRIEVE SECURITY ASSOCIATION —— 724

ENCRYPT/ AUTHENTICATE PACKET —— 726
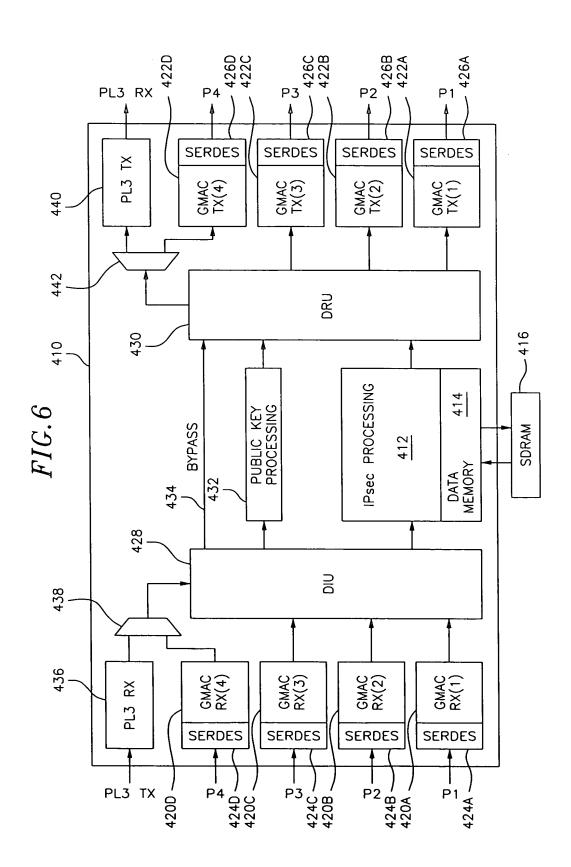
ASSEMBLE IPSEC PACKET —— 728

TRANSMIT PACKET —— 730

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FIG. 10

OUTBOUND PACKET 812

| ETHERNET |
| CLASS-0 |
| ETHERNET |
| IP HEADER |
| DATA |

SECURITY PROCESSOR 810

CLASS-0
FLOWID[21:0]

LOCAL MEMORY 816

SA_LEN(FLOWID[23:22]) 822

820

| MCW |
| SAUPDATE |
| SADATA |
| OUTER IP HEADER |
| ESP HEADER |
| IV |

818

814

| ETHERNET HEADER |
| OUTER IP HEADER |
| ESP HEADER |
| IV |
| IP HEADER |
| DATA |
| ESP TRAILER |

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Inventor(s): Mark L. Buer, et al.
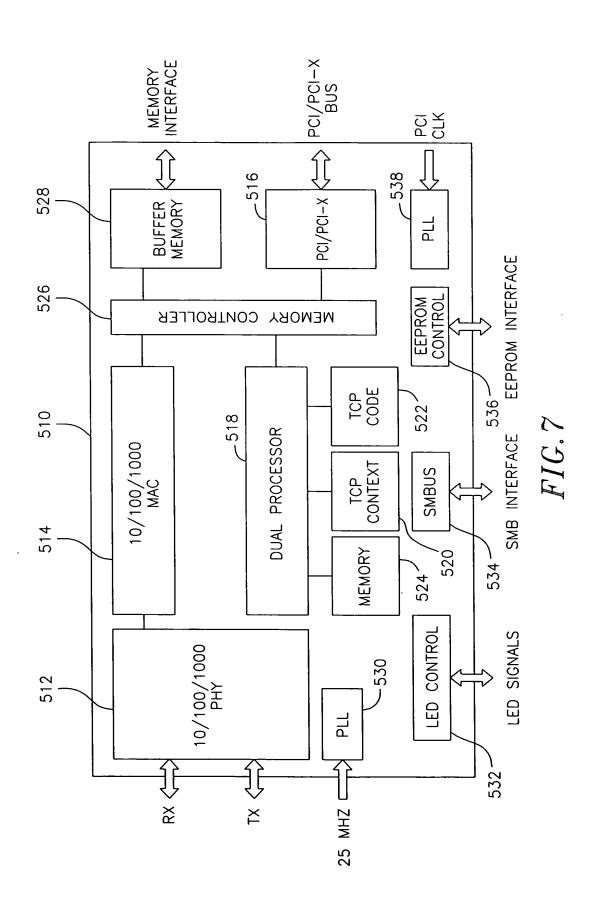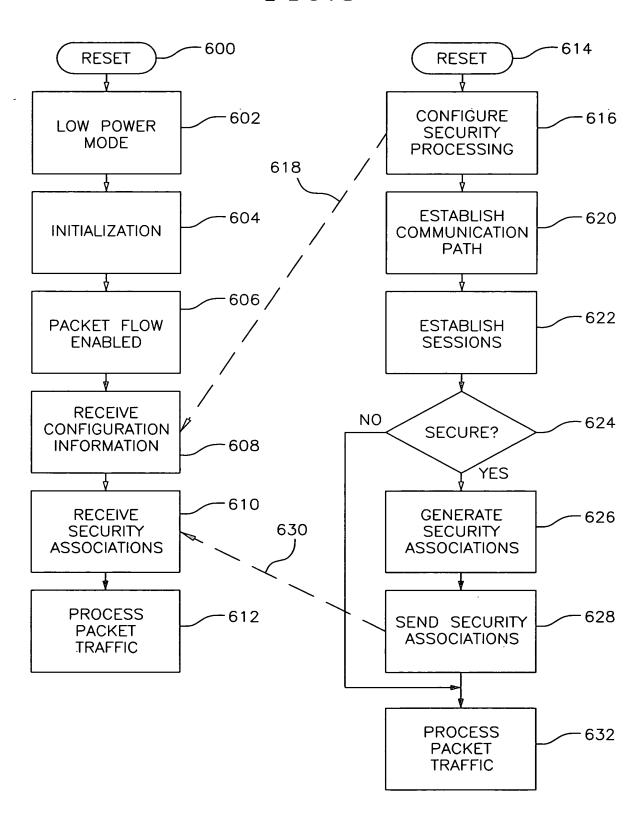Title: TAGGING MECHANISM FOR DATA PATH
SECURITY PROCESSING
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FIG. 11

```
      ( BEGIN )──── 900

   ┌──────────────┐
   │   RECEIVE    │──── 902
   │   PACKET     │
   └──────────────┘
          │
          ▼
   ┌──────────────┐
   │ EXTRACT  SPI │──── 904
   │              │
   └──────────────┘
          │
          ▼
        ╱────────╲ ──── 906
      ╱            ╲      NO
     ╱  CHECK  FLOW ╲──────────┐
     ╲              ╱          │
      ╲            ╱           │
        ╲────────╱             │
          │                    │
         YES                   │
          ▼                    │
   ┌──────────────┐            │
   │ UNENCAPSULATE│            │
   │ IPSEC PACKET │──── 908    │
   └──────────────┘            │
          │                    │
          ▼                    │
   ┌──────────────┐            │
   │  RETRIEVE    │──── 910    │
   │  SECURITY    │            │
   │  ASSOCIATION │            │
   └──────────────┘            │
          │                    │
          ▼                    │
   ┌──────────────┐            │
   │  DECRYPT/    │──── 912    │
   │ AUTHENTICATE │            │
   │   PACKET     │            │
   └──────────────┘            │
          │                    │
          ▼◄───────────────────┘
   ┌──────────────┐
   │    SEND      │──── 914
   │   PACKET     │
   └──────────────┘
```

```
   ┌──────────────┐
   │   RECEIVE    │
   │   PACKET     │──── 916
   └──────────────┘
          │
          ▼
   ┌──────────────┐
   │ UNENCAPSULATE│──── 918
   │   PACKET     │
   └──────────────┘
          │
          ▼
   ┌──────────────┐
   │  SEND  DATA  │──── 920
   │  TO  HOST    │
   └──────────────┘
```
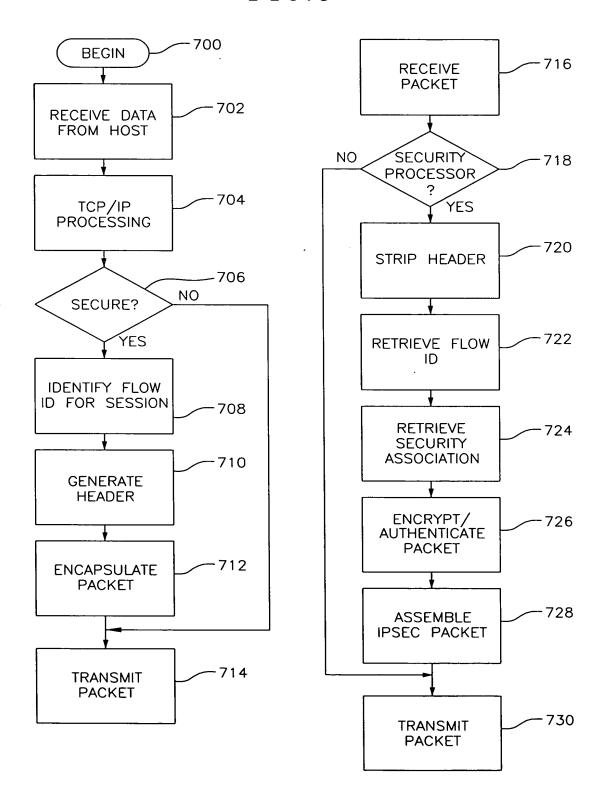
Attorney: Stephen D. Burbach
Docket No.: 48946/SDB/B600
Inventor(s): Mark L. Buer, et al.
Title: TAGGING MECHANISM FOR DATA PATH
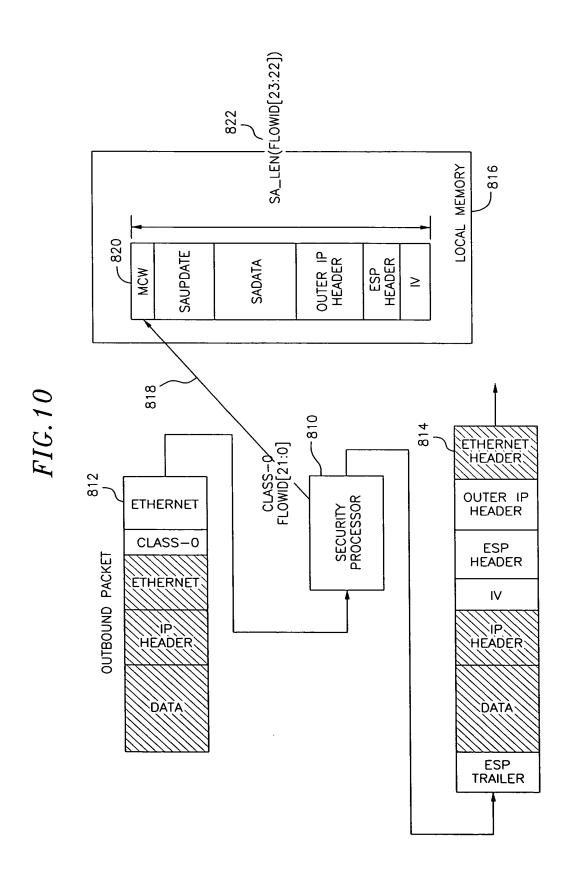SECURITY PROCESSING
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FIG. 12

INBOUND PACKET — 1012

| ETHERNET HEADER |
| OUTER IP HEADER |
| ESP HEADER |
| IV |
| IP HEADER |
| DATA |
| ESP TRAILER |

SPI

SECURITY PROCESSOR — 1010

1014

| ETHERNET |
| IP HEADER |
| DATA |

1016

MEMORY — 1018

1022 — UPDATEABLE SA FIELDS

1020 — MCW / SAUPDATE / SADATA

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Title: TAGGING MECHANISM FOR DATA PATH
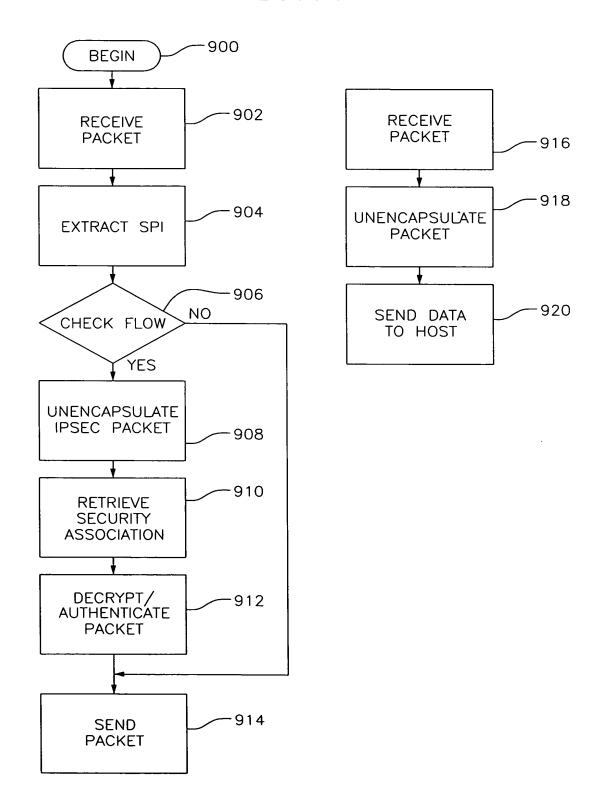SECURITY PROCESSING
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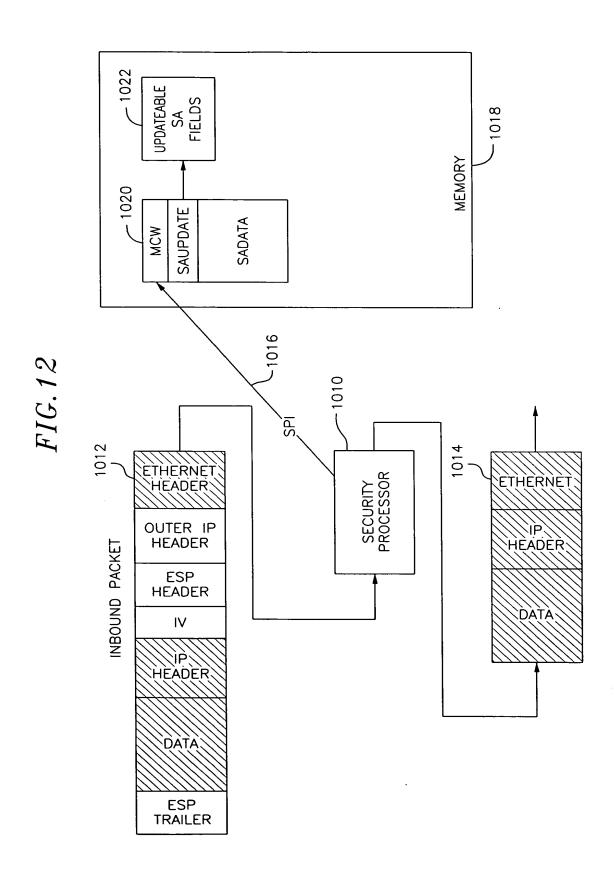*FIG.13*

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FIG.14

INBOUND PACKET

1212

| ETHERNET HEADER |
| OUTER IP HEADER |
| ESP HEADER |
| IV |
| IP HEADER |
| DATA |
| ESP TRAILER |

1210

SECURITY PROCESSOR

1216

| EXCEPTION ETHERNET |
| MCW |
| ETHERNET |
| IP HEADER |
| DATA |
| PACKET STATUS |

EXCEPTION PACKET HEADER

1214

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Inventor(s): Mark L. Buer, et al.
Title: TAGGING MECHANISM FOR DATA PATH
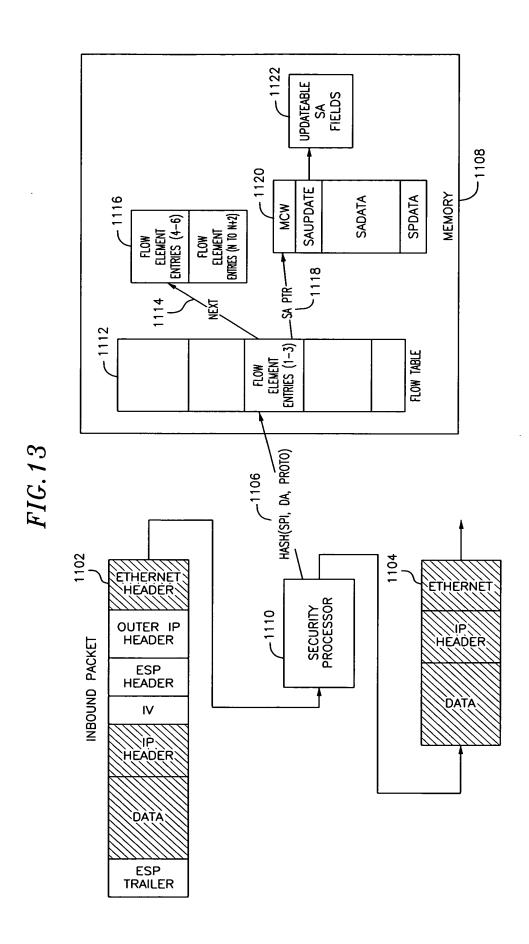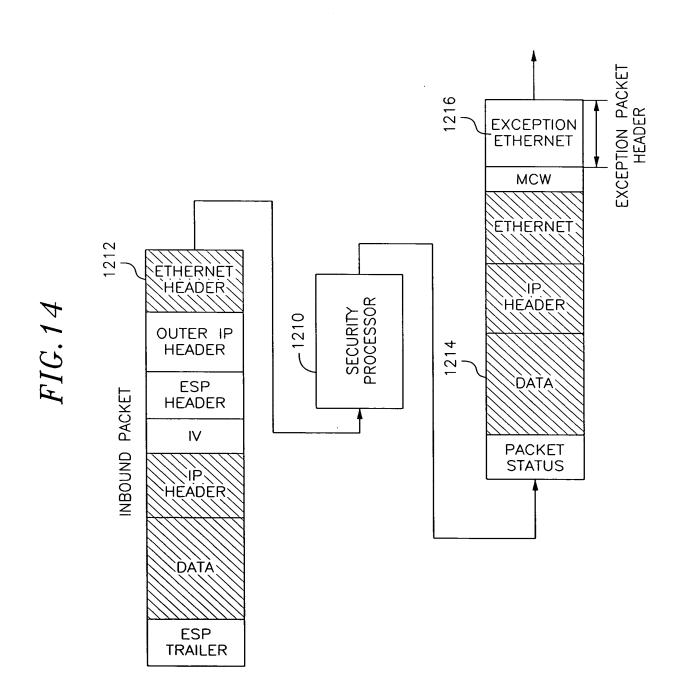SECURITY PROCESSING
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ETHERNET II

1310

6 BYTES	6 BYTES	0X08:00	46-1500 BYTES	4 BYTES
DA	SA	TYPE	PAYLOAD	FCS

IEEE 802.3 SNAP

1312

IEEE 802.3 HEADER | | | 802.2 LLC | SNAP HEADER

6 BYTES	6 BYTES	<= 0X05:DC	0XAA	0XAA	0X03	0X00:00:00	0X08:00	38-1492 BYTES	4 BYTES
DA	SA	LENGTH	DSAP	SSAP	CONTROL	ORG CODE	TYPE	PAYLOAD	FCS

ETHERNET II VLAN

1314

QTAG PREFIX

6 BYTES	6 BYTES	0X81:00	2 BYTES	0X08:00	46-1500 BYTES	4 BYTES
DA	SA	VLAN PREFIX	VLAN TAG	TYPE	PAYLOAD	FCS

IEEE 802.3 SNAP VLAN

1316

QTAG PREFIX | | | | | | 802.2 LLC | | SNAP HEADER

6 BYTES	6 BYTES	0X81:00	2 BYTES	<= 0X05:DC	0XAA	0XAA	0X03	0X00:00:00	0X08:00	38-1492 BYTES	4 BYTES
DA	SA	VLAN PREFIX	VLAN TAG	LENGTH	DSAP	SSAP	CONTROL	ORG CODE	TYPE	PAYLOAD	FCS

FIG.15

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Inventor(s): Mark L. Buer, et al.
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OUTPUT PACKET

ETHERNET
PROCESSED PACKET

1514

CTU PROCESSED PACKET

DEFAULT MCW			
FLAGS	HDRLEN	TOTAL LENGTH	SA_PTR
V	SA LEN		
ETHERNET			
IP PACKET			

1512

INPUT PACKET

1516

ETHERNET (MFG)
MFG HDR (CLASS-0)
ETHERNET
IP PACKET

1518

1510

FIG.16

Attorney: Stephen D. Burbach
Docket No.: 48946/SDB/B600
Inventor(s): Mark L. Buer, et al.
Title: TAGGING MECHANISM FOR DATA PATH
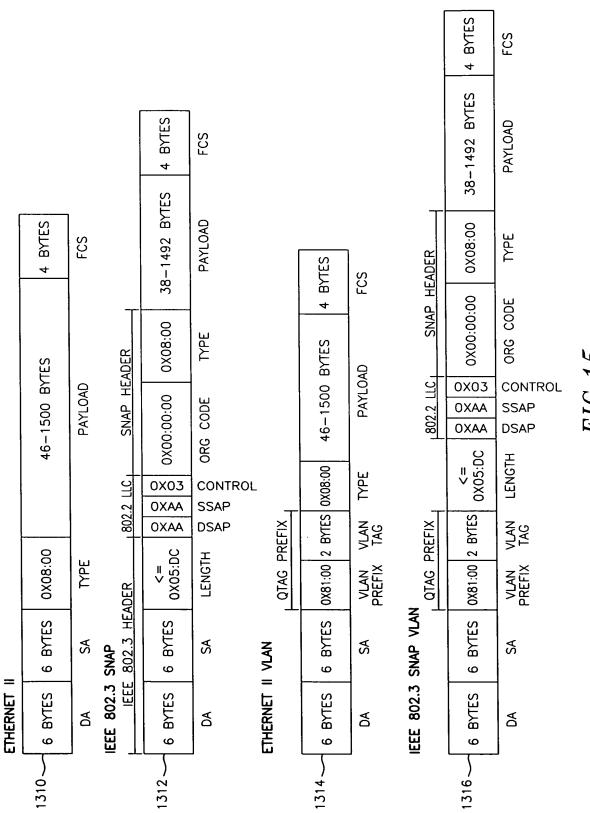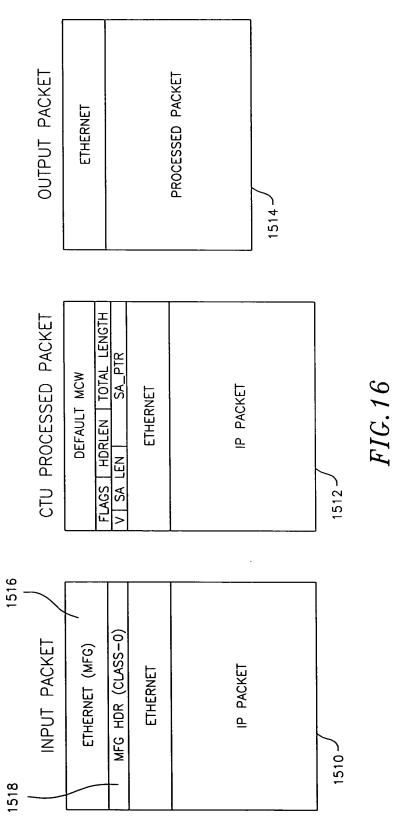SECURITY PROCESSING
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INPUT PACKET

ETHERNET (MFG)		
F	C	
MCW		1
ETHERNET		
F	C	
REGISTER ACCESS WORD		
CONFIGURATION PACKET		
RAP/MAP/MEP/FAP		
HOST CONTEXT		

1614 1616 1618 1610

OUTPUT PACKET

ETHERNET		
F	C	
REGISTER ACCESS WORD		
CONFIGURATION PACKET		
RAP/MAP/MEP/FAP		
HOST CONTEXT		
PACKET STATUS		

1620 1622 1612

FIG. 17

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Docket No.: 48946/SDB/B600
Inventor(s): Mark L. Buer, et al.
Title: TAGGING MECHANISM FOR DATA PATH
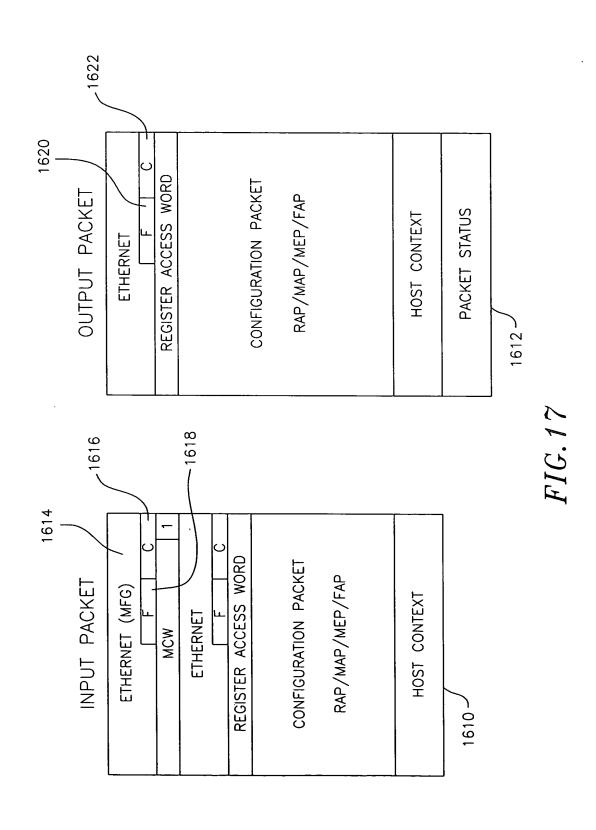SECURITY PROCESSING
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OUTPUT PACKET

| HOST CONTEXT |
| ETHERNET |
| BUFFER DATA |

1712

INPUT PACKET

1714
1718
1716

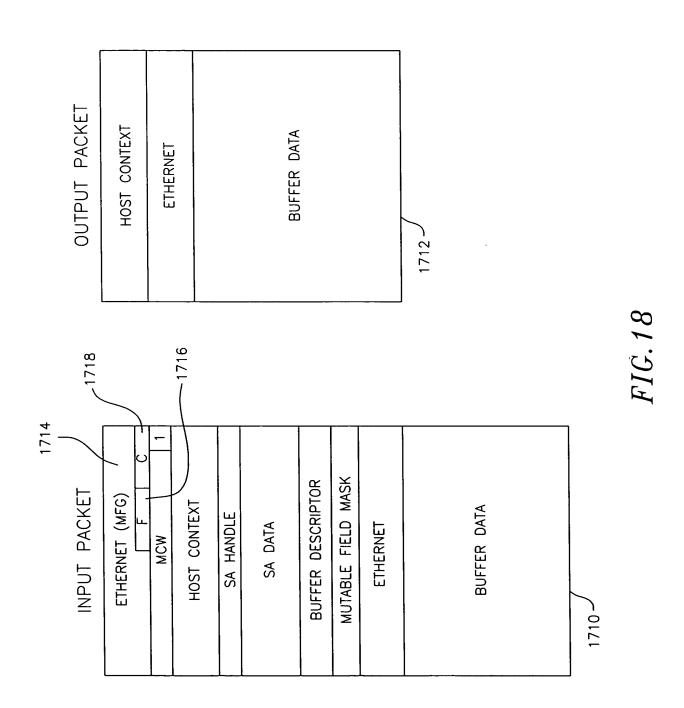| ETHERNET (MFG) | F | C | 1 |
| MCW |
| HOST CONTEXT |
| SA HANDLE |
| SA DATA |
| BUFFER DESCRIPTOR |
| MUTABLE FIELD MASK |
| ETHERNET |
| BUFFER DATA |

1710

FIG.18

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FIG.19

DDR–SDRAM 1824

SECURITY PROCESSOR

SERDES 1822

SERDES

SERDES 1820

SERDES

SWITCH 1814

CPU 1816

1818

ETHERNET CONTROLLER 1812

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FIG.20

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Docket No.: 48946/SDB/B600
Inventor(s): Mark L. Buer, et al.
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FIG.21